An Attempt to Improve Decision Confidence in Regret-Based Decision-Makers

Honors Research Thesis

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Abstract

For some individuals, daily decisions are a struggle because they worry about the regret they will feel if they make a poor choice. This regret-based decision style is associated with lower decision confidence, lower general self-efficacy and lower optimism, and greater decisional self-doubt. This study sought to improve these individuals' decision confidence by selecting those with a slight tendency toward either an analytical or an intuitive decision-style and reinforcing this existing tendency. This intervention was predicted to increase their confidence because endorsing either style correlates positively with self-efficacy and optimism, and negatively with decisional self-doubt. Fifty-eight regret-based individuals with slight analytical or intuitive tendencies, or both ("flexible" decision-makers) were selected using The Decision-Making Styles Inventory. Individuals from each of the 3 decision-style groups were randomly assigned to manipulation or control conditions. Subjects completed General Self-Efficacy and Optimism measures. Then the 3 manipulation groups were informed of their decision-making tendencies, and the benefits of their particular styles, while control groups were simply told that people use various decision styles. Next subjects responded to decision scenarios, rating decision confidence and difficulty for each, and then completed the self-efficacy and optimism measures again. The only statistically significant result was that the manipulation group had lower decision confidence. Overall, the manipulation did not produce the predicted results. If the results had been as predicted, this intervention would have provided support for a relatively simple way to increase decision confidence in those who worry about experiencing decisional regret.

Improving Decision Confidence in Regret-Based Decision-Makers

Each day, people make many different decisions using a variety of approaches which could be termed "decision-making styles." Research has shown that individuals have a consistent tendency to rely on particular decision approaches (Beach & Mitchell, 1978; Einhorn, 1970; Payne, Bettman & Johnson, 1993). A self-report instrument, the Decision Making Styles Inventory (DMI) was created by Nygren (2000) to assess the degree to which people rely on these individual styles. It allows researchers to determine if individuals are more prone to report an "analytical" decision making style, an "intuitive" decision making style, or a "regret-based emotional" decision making style.

Individuals who show a greater propensity toward an analytical style are more likely to thoroughly analyze their choice options, typically comparing choice alternatives and their attributes using a structured decision rule to derive what they perceive to be an optimal decision. Individuals with propensity toward an intuitive decision style tend to go with their instincts instead of systematically analyzing their decision options and come up with their decisions by relying on their "gut-feeling" or satisficing. They are less likely to use a specific decision rule.

The concept of these two decision types can be seen as an outgrowth of dual process theory, which argues that people use two different modes of thinking—analytical-rational and intuitive-experiential (Epstein, 1994, 1998; Sloman, 1996). The Rational Experiential Inventory (REI), developed by Epstein and colleagues (1996) to measure these two modes, has been compared to the DMI. The intuitive scale of the DMI correlates highly with the intuitive-experiential scale (r=.633) of the REI. This suggests they are measuring much the same construct. The analytical scale of the DMI correlates only modestly with Epstein's REI Rational

scale (r=.384), which is a modified Need for Cognition scale (Cacioppo & Petty, 1982). Need for cognition refers to the tendency for people to vary in the extent to which they engage in and enjoy effortful cognitive activities, and though an analytical decision style is related to need for cognition, it is conceptually different (Nygren & White, 2002).

The third decision style measured by the DMI is a Regret-based emotional style. These decision makers typically wish to avoid making decisions due to fear of regret. They would not endorse statements such as "I think that I could keep myself from worrying later if I had made a bad decision," but would endorse items such as "I often procrastinate when it comes to making important decisions" (Nygren, 2000; Nygren & White, 2002). This decision style can be related to the self-protective role of negative emotions, such as *regret*, which has been actively investigated in pursuit of understanding decision making behaviors (Josephs, Larrick, Steele & Nisbett, 1992).

The three decision making styles measured by the DMI are conceptualized as independent constructs, allowing for individuals to employ different styles to varying degrees. Thus, an individual's propensity toward one style does not preclude use of the other two styles (Nygren & White, 2002).

The emotional regret-based decision style correlates with a number of potentially negative characteristics (Nygren & White, 2002). In one recent study, there was a positive correlation between regret-based decision-making and the decision difficulty subscale of the Maximization Inventory (Tuner, Rim, Betz, & Nygren, 2012; Rim, 2012). Decision difficulty represents the degree of difficulty experienced when choosing among abundant options. Although having some mild decision difficulty is not necessarily a negative thing, having too

much can be quite detrimental, especially if someone has a tendency to wish to avoid or procrastinate on decisions, as regret-based individuals do

In another study by Nygren and White (2005), it was found that a regret-based decision making style was associated with greater generalized self-efficacy, generalized self-regard, instrumentality, optimism, emotional stability and decisional-self-doubt. This makes sense because the anticipated negative emotions associated with this style are related to negative self-concepts, such as low self-efficacy and low self-regard (Josephs, Larrick, Steele, & Nisbett, 1992). Additionally, pessimists (i.e., individuals with low optimism) tend to focus on anticipated stresses, such as regret, rather than desired goals, when they have decisional tasks to accomplish (Scheier, Carver, & Bridges, 1994).

Endorsement of either an analytical or intuitive decision-making style was associated with lower decision-difficulty and greater generalized self-efficacy, generalized self-regard, instrumentality, optimism and emotional stability. Endorsement of both decision styles showed an even greater positive correlation with self-efficacy, self-regard, instrumentality, optimism and emotional stability. This makes sense because positive self-concepts have been identified as major sources of cognitive motivation (Bandura & Schunk, 1981) and analytical decision making demands the use of cognitive resources. Therefore, it follows that individuals with high analytical style would tend to have positive self-concepts such as high self-efficacy. People with positive self-concepts also have a tendency to overestimate their decision making competencies (Baumeister, Heatherton, & Tice, 1993). Accordingly, individuals with high intuitive style would likely have positive self-concepts, based on their willingness to follow "gut" feelings in order to maximize decision making outcomes. Additionally, dispositional optimism has also been associated with coping strategies used to overcome challenges in various domains (Carver,

Scheier, & Weintraub, 1989). More specifically, people with positive expectations for their future tend to use problem-focused coping strategies to achieve their goals. Therefore, it makes sense that optimism positively correlated with analytical and intuitive decision making styles, which both use problem-focused strategies to maximize decision making outcomes

Clearly there are a number of negative traits tied to being a regret-based decision-maker, and a variety of positive traits related to endorsing either an analytical or intuitive style. The previous study also showed that in those individuals who endorsed both an analytical and regret-based or intuitive and regret-based style, the negative correlation with the previously mentioned traits actually was smaller than in those who were simply regret-based (Nygren & White, 2005). This brings up the question of whether encouraging someone who is regret-based, but who also shows some degree of analytical or intuitive propensity, to focus on these more efficacious decision-making styles, rather than on their fear of regret or decision avoidance, would lead to more positive outcomes and self-confidence for this individual. Previously, little research has examined the possibility of attempting to increase the decision confidence, and decrease the decision avoidance of regret-based decision makers. If it were possible to make individuals less decision avoidant and create a lasting change in these individuals decision-making confidence it could have positive implications in their everyday decision-making and possibly result in a lasting reduction some of the negative traits associated with avoidance such as low self-efficacy and low optimism.

Based on past research, we hypothesized that regret-based decision-making individuals who are also analytical or intuitive or both (flexible decision-makers) and are told that they have been found to be analytical, intuitive or flexible decision-makers, respectively, and the benefits of their decision-making style, would have higher decision confidence and less decision

difficulty than individuals who are not informed of their decision-making style. They would also see an increase in generalized self-efficacy and optimism after being reinforced in their decision style, while those not reinforced would see no change.

Methods

Participants

One-hundred-twenty-one Psychology 1100 students from the Ohio State University were recruited via the REP for class credit over the course of the 2013-2014 school-year.

Materials

Decision Style Measure *DMI* (Nygren, 2000), a 45-item self-report measure using a Strongly Disagree to Strongly Agree rating scale, was used to assess individual decision making styles (i.e., analytical, intuitive, and regret-based). Participants rated how strongly they agreed with statements like "I feel that if I plan my decisions carefully I will make good decisions" (analytical statement), "I can get a good 'feeling' for most decision situations very quickly" (intuitive statement) and "I tend to be someone who worries a lot over decision I've made" (regret-based statement). This scale has been shown to be internally reliable with coefficient alphas of .88, .86 and .86 and test-retest reliabilities of .81 .81, and .87, for the analytical, intuitive, and regret-based scales, respectively (Nygren, 2000). The validity of the analytical decision making style scale is supported because those who endorse an intuitive style are high in impulsivity ($r = .320$) and belief in luck ($r = .274$), while those who endorse an analytical style are less likely to be risk seeking ($r = -.214$) or impulsive ($r = -.394$), and are more likely to be rational thinkers ($r = .333$ with Epstein's REI Experiential Scale (S. Epstein et. Al, 1996)). Those who endorse an avoidant regret-based decision style are also less likely to be risk-takers

(r= - .303) and, unlike analytical decision-makers, are also high in self-doubt (r = .463), which is as expected (Nygren, T. & White, R.J., 2005). See the complete DMI in Appendix A.

Other Measures. *The Generalized Self-Efficacy Scale* (Schwarzer & Jerusalem, 1995) was used to measure a generalized expectation of success rather than failure in new situations. It consists of a ten-item scale in which subjects rank how strongly they agree with statements like "if I am in trouble I can usually think of a solution" (1=not at all true, 4=exactly true). Reliability is supported because in samples from 23 nations, Cronbach's alphas ranged from .76 to .90, with the majority in the high .80s. Criterion-related validity is documented in numerous correlation studies where positive correlations were found with favorable emotions, dispositional optimism, and work satisfaction. Negative correlations were found with depression, anxiety, stress, burnout, and health complaints (Leganger, Kraft & Røysamb, 2000; Schwarzer, Mueller & Greenglass, 1999; Luszczynska, Scholz & Schwarzer, 2005). See the Generalized Self-Efficacy scale in Appendix B.

The Optimism Scale-Revised (Scheier, Carver, & Bridges, 1994). A 10-item scale (4 filler items) in which subjects rank how strongly they agree with statements like "in uncertain times, I usually expect the best" (1=I DISagree a lot, 5=I agree a lot). Item scale correlations ranged from .43 to .63, showing that each item to some extent measures the same underlying construct but is not redundant with other items. Test-retest correlations were .68 for 4 months, .60 for 12, .56 for 24, and .79 for 28, which shows relative stability over time. The scale also correlates positively with self-esteem and self-mastery, and negatively with neuroticism and trait anxiety, which is as expected (Scheier, Carver, & Bridges, 1994). See the Revised Optimism Scale in Appendix C.

Procedure

The DMI was administered electronically to each participant. Individuals who scored relatively high in regret (top 50%) and relatively high (top 50%) in one of the other two decision styles under consideration (either analytical or intuitive decision-making style) or in both (considered a "flexible" decision style) were selected, resulting in a sample size of 58. The regret-based individuals in these analytical, intuitive, and "flexible" groups were then divided into a control group and an experimental group, producing a 2x3 between-subjects design. See Figure 1 for a detailed diagram of participant group assignment. After completing the DMI, subjects also completed The Generalized Self-Efficacy Scale and The Optimism Scale-Revised.

Participants in each experimental group then read a statement explaining that the individual scored highly in terms of propensity towards using an analytical or intuitive decision-making style or both, respectively, and the benefits of using their particular styles. For example, analytical decision-makers were told that analytical decision-makers "tend to analyze the choice alternatives and use critical thinking to make their choices. This yields well thought-out decisions." Subjects were also given several examples of when their decision style would be effective in the real world. For example, analytical individuals were told that "doctors need to thoroughly examine patient symptoms, and systematically determine a diagnosis". The control groups were simply told that people use a variety of different decision-making styles in their daily lives and that these have both benefits and drawbacks based on a given situation. See Appendix D for a full description of the instructions received by each manipulation group and the control group.

Each group then completed a series of thirteen decision-making tasks, which consisted of open-ended questions in which subjects chose between options in realistic and semi-realistic scenarios. For example, they were asked to select an apartment to rent from a list of potential apartments (including information like rent, space, parking availability, etc.). See Appendix E for a complete list of decision scenarios.

After each decision, participants reported their decision confidence and rated the difficulty of making the decision, via Likert-type scales, as well as completing a manipulation check. The check asked them to rate the extent to which they assessed their choice options, which was meant to quantify to what extent they approached the decision analytically. It also asked them to rate and the extent to which they made an instinctive decision, which was meant to assess the extent to which they approached the decision intuitively. See Appendix F for the decision confidence and difficulty scales, as well as the manipulation check questions. At the end of the experiment, they again rated their self-efficacy and optimism.

Results

We hypothesized that regret-based decision-makers who also had a tendency to be either somewhat analytical or intuitive or both (flexible) and correspondingly were informed of this tendency, and the benefits of their respective analytical, intuitive or flexible style, would exhibit an increase in generalized self-efficacy and optimism post intervention. A control group of individuals who were not informed of their decision-making style would see no change. Further, the manipulation group was predicted to show higher decision confidence and less decision difficulty post intervention than the control group.

A t-test was used to compare the control (n=31) and manipulation (n=27) groups. Decision confidence was significantly greater in the control group (M=3.50, SD=.508) than the manipulation group (M=3.23, SD=.451), [t(56) = -2.16, p=.036]. Decision difficulty was non-significantly lower in the control group (M=2.44, SD=.550) than in the manipulation group (M= 2.55, SD=.550) [t(56)=.726, p=.471]. These results are represented in Figure 2. Neither of these outcomes supports the hypothesis.

Paired-samples t-tests were conducted to compare subject pre and post-intervention self-efficacy and optimism. In the control group there was no significant change in efficacy from pre-intervention (M=3.16, SD=.414) to post-intervention (M=3.17, SD=.472) [t(30)=-.129, p=.898].Nor was there a significant change in optimism pre (M=3.60, SD=.859) to post (M=3.53, SD=.802) intervention [t(30)=1.25, p=.223]. This fits the hypothesis—no change was expected on either measure in the control group

In the manipulation group there was no significant change in self-efficacy from pre (M=3.12, SD=.434) to post (M=3.05, SD=.489) intervention [t(26)=1.78, p=.087]. There was no significant change in optimism from pre (M=3.32, SD=1.10) to post (M=3.24, SD=1.01) intervention [t(26)=1.12, p=.275]. This does not support the hypothesis that the manipulation group would see an increase in self-efficacy and optimism.

As a check of the effectiveness of the decision style reinforcement, individuals were asked to rate the extent to which they analyzed their choice options and the extent to which they made an instinctive decision for each of the decision scenarios. An average was then computed across all the scenarios. A one-way between subjects ANOVA was conducted to compare the effect of a combination of initial decision-making propensity and experimental group on

tendency to approach decision scenarios in an intuitive or an analytical manner. The six groups examined were those with an initial analytical tendency who were reinforced as analytical (n=15), those with an initial intuitive tendency who were reinforced as intuitive (n=5), those with initial intuitive and analytical tendencies who were reinforced as flexible (n=7), those with intuitive tendencies in the control group (n=5), those with analytical tendencies in the control group(n=16), and those with both analytical and intuitive tendencies (n=10) in the control group. A one-way ANOVA was selected rather than factorial ANOVA because the independent variables of interest--initial decision-making tendency and experimental group, were not independent of each other; for those assigned to the manipulation condition, initial tendency was used to determine the manipulation condition into which they were placed.

Results of the one-way ANOVA indicated that there was a significant effect of initial decision-making tendency/experimental group on likelihood of approaching decision scenarios in an intuitive manner for the six conditions [$F(5, 52)=5.04$, $p<.01$]. Post hoc comparisons using the Tukey HSD test indicated that the mean score for the analytical manipulation group ($M=2.63$, $SD=.781$) was significantly lower than for the flexible manipulation ($M=3.45$, $SD=.545$), flexible control ($M=3.62$, $SD=.534$), and intuitive control ($M=3.78$, $SD=.378$) groups. This makes sense because analytical decision makers might be expected to be less likely make their decision based on “instinct”, which is what the manipulation check asked them to rate for each decision. However, the finding that the intuitive manipulation group did not differ significantly from any of the groups in terms of tendency to approach the scenarios in an intuitive manner brings the effectiveness of the manipulation into question. If the manipulation had been strongly effective then one would have expected the intuitive manipulation group to have the strongest tendency to

approach scenarios intuitively, and to exhibit this tendency statistically significantly more so than the intuitive control group.

However, one must note that the flexible manipulation and control groups, as well as the intuitive control groups, all had greater scores on the DMI intuitive scale than the intuitive manipulation group did. Although not greater to the point of being significant, this does indicate that they may have been somewhat more intuitive to begin with, before any manipulation was performed--a possible confounding factor which might have negated the effected of reinforcing intuitive style in the intuitive manipulation group.

There was no significant effect of initial tendency/experimental group on tendency to approach decision scenarios in an analytical manner for the six conditions [$F(5, 52)=1.11$, $p=.368$]. However, the analytical manipulation group did have the greatest tendency to approach scenarios in an analytical manner, followed by the flexible control group and then the analytical control group. Though non-significant, this trend is approximately what might have been predicted, aside from the highly analytic tendency of the flexible control group. Looking at the initial DMI scores, the flexible manipulation group had the greatest initial analytical tendency, followed by the analytical manipulation group, and the analytical control group (non-significant). This indicates that initial decision-making tendency played a role in determining how individuals approached the scenarios, and might have interfered with manipulation effect.

Finally, the three experimental groups (reinforced as intuitive (n=10), analytical (15), flexible (n=7)) and the combined control group were also compared individually using a 1-way ANOVA in order to see if a perhaps reinforcing a particular decision style was more effective. There were no significant results.

Discussion

We had hypothesized that regret-based decision-makers who were also analytical or intuitive or both (flexible), and were told that they had been found to be analytical, intuitive, or flexible respectively, and were explained the benefits of their respective decision-making styles would have greater decision confidence and lower decision difficulty than those who were not informed of and reinforced in their positive decision tendency. This hypothesis was not supported, as decision confidence was significantly higher in the control group and decision difficulty was non-significantly lower. We had further hypothesized that those affirmed in their decision styles would see an increase in generalized self-efficacy and optimism, while individuals not informed of their decision style would see no change. This hypothesis was not supported, as there was no significant change in optimism or self-efficacy in either group.

Taken together, these results suggest that the manipulation may have been ineffective. A possible explanation might be that reinforcing an analytical style could have been ineffective in increasing decision confidence. Though the tendency to exhibit this decision style had been shown to have a positive correlation with generalized-self efficacy and optimism, which was part of the foundation for our initial hypothesis, this decision style only has a very small negative correlation with decisional self-doubt (r=-.001). The intuitive style, on the other hand, has a larger correlation (r=-.197) (Nygren & White, 2005). One must note that the results of the 1-way ANOVA indicate that even directly comparing each manipulation group (reinforced as intuitive, analytical, flexible) with the control group did not yield significant results for any of the three manipulation groups. This indicates that the type of decision style reinforced did not affect the subject outcome. However, this analysis may have been lacking in power due to small sample size.

The lack of significant results may have been, in part, due to the small sample size. This necessitated the use of median splits, rather than a more specific, limited range to select subjects who endorsed a regret-based decision style. This meant that some of the individuals included may not have strongly endorsed a regret-based style, falling close to the median. So they may already have been fairly confident decision-makers, and the manipulation may have had less effect. Median-splits were also used to select individuals who exhibited analytical, intuitive or flexible tendencies. This might have resulted in the inclusion of individuals who already highly endorsed a particular decision style. Thus reinforcing this trait in them would not be as effective, because there would be little room for manipulation. On the other hand some individuals may have scores so close to the median that their tendency was too weak to easily reinforce.

Finally, the small sample size resulted in fairly small group sizes when the six manipulation groups were compared separately (with the smallest, the intuitive control and manipulation groups, having only 5 subjects in each). This would have resulted in decreased power, and made it difficult to determine whether perhaps reinforcing one type of decision-style was more effective. Power would also have been an issue for the manipulation check, where the six groups were also compared separately. This might have made it more difficult to accurately assess the manipulation's effect.

If the study had a larger sample size (or pre-screening) it might have been more effective to select individuals who scored in the 55^{th} to 85^{th} percentiles in terms of analytical or intuitive tendency (or both), and in the top 33% in terms of regret-based tendency. This would have resulted in a sample of highly-regret-based decision-makers with moderate analytical or intuitive tendencies. The manipulation might have been most effective on such a group of individuals. The only drawback being that this might limit generalizability.

Another issue that may help to explain the lack of significant results, and that may have affected the internal validity of the study, was that some individuals had to restart the survey or redo parts of the survey due to internet connection issues. This may have impacted the internal validity, particularly as it is impossible to track who exactly had this happen to them and of which experimental group they were a part. Frustration from this issue might have impacted individual's decision confidence, self-efficacy ratings, etc. Additionally, some individuals may have been randomly assigned to, and received the manipulation, and then had to start the survey again and been randomly assigned to control group the second time through, or vice versa. This might have weakened the observed manipulation effect.

Finally, self-efficacy and optimism are trait, rather than state, measures. This makes them more difficulty to change, particularly within the limited time frame of the study (measured before and after the manipulation, with likely as little as twenty minutes between measurements). Perhaps if the manipulation had been very strong one might have seen a difference, but even then it is possible that subjects completing the self-efficacy and optimism measures after the manipulation would have recalled, and been influence by, their previous responses to the questionnaires earlier in the study. It might have benefitted the study to simply focus on decision confidence and decision difficulty. It might also have been interesting to have some measure of decision avoidance, although this would be difficult to measure with open-ended questions that the subjects would have had no incentive to avoid. However, perhaps the study could have used decision scenarios that did result in some kind of outcome, possibly with a monetary incentive for subjects. Then subjects could have been given the opportunity to skip questions and come back to them later as a measure of avoidance. Having the subjects receive feedback on their decisions (possibly after they had completed all the decision scenarios) with an incentive for

making decisions that resulted in positive outcomes, might have also made the effects of a regret based style more apparent—if the subjects had more at stake in making the decisions. This idea is supported by the findings of a previous study which found that regret-minimizing choices occurred when feedback about the decisional outcome was expected, but not otherwise (Josephs, Larrick, Steele & Nisbett, 1992).

Future research still needs to be conducted to determine an effective means of improving the decision confidence of regret-based decision makers. As people are faced with a multitude of decisions every day, improving the decisional confidence or those who struggle because they worry about the regret they will feel if they make a poor decision could help reduce daily stress and improve these individuals' lives. Perhaps, if the strategy was particularly effective, it could be used to help almost anyone make decisions in a more self-assured way.

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Figure 1

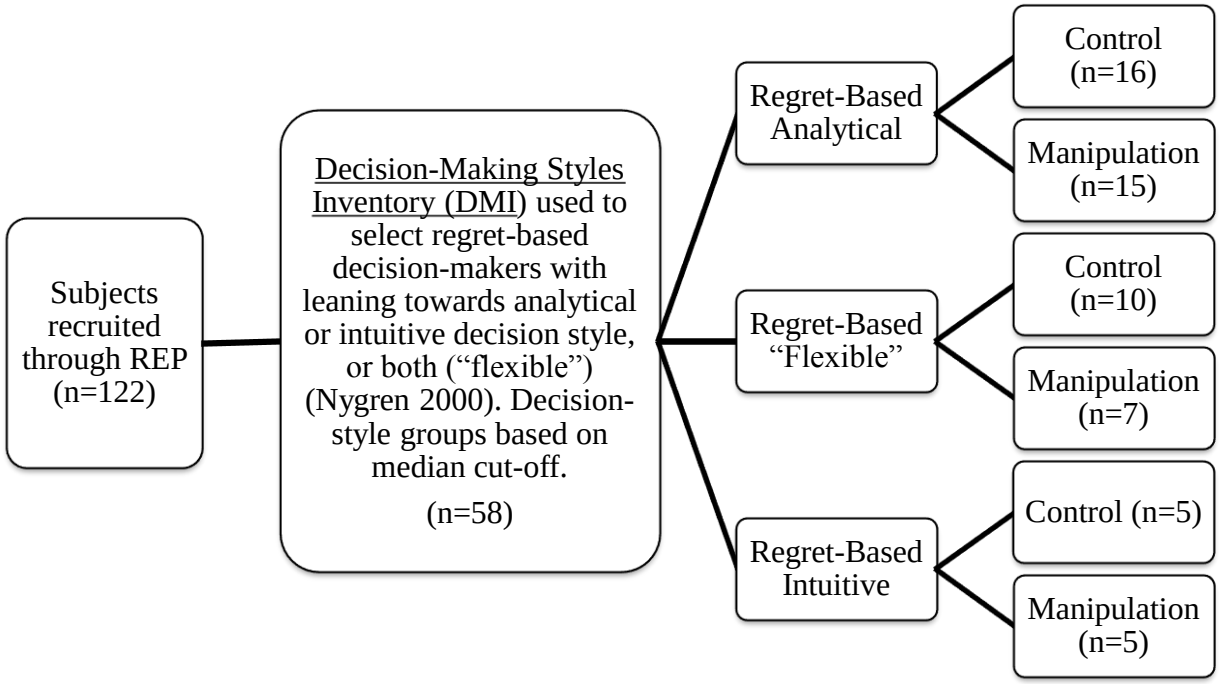

Figure 1. Flow of subjects from their initial selection to their division into control and manipulation groups.

Figure 2

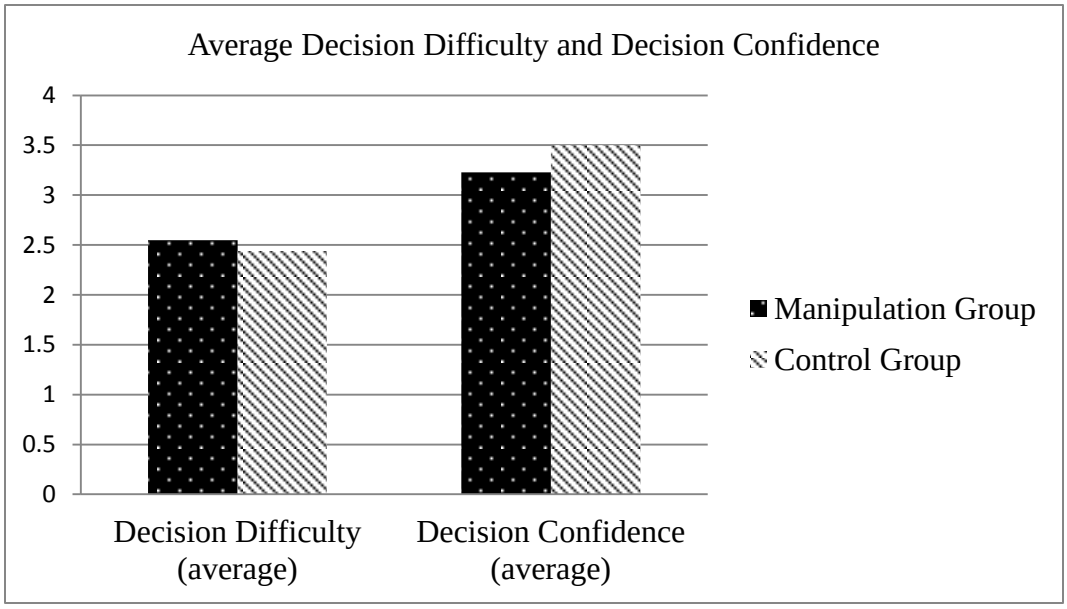

Figure 2. Difference in average decision difficulty and average decision confidence across all decision scenarios. Comparison between the combined manipulation group (those reinforced as analytical, intuitive and flexible) and combined control group.